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ABSTRACT

Question-answer interactions were chosen as an effective means of investigating the effect of the linguistic environment on language development. Research was reviewed indicating that the improvement in question and answer performance of a maturing child is based on the advancement of both his linguistic and cognitive abilities and that the adult systematically accomodates his speech with a child to those abilities. A categorization scheme was devised for the ranking of question types according to their cognitive and syntactic complexity and for the rating of answers according to their appropriateness and syntactic level. It is proposed that detailed analyses of a variety of adult-child question-answer interactions should provide important information concerning the theoretical role of adult accommodation to the child's level as well as principles leading to new language training techniques. (Author)

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The Role of Question-Answer Interactions in Language Development*

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Adult-child interactions, especially those involving the mother, have attracted much attention recently among developmental psycholinguists. Lewis (1963) has emphasized the role of the question-answer interchanges that occur in such conversations suggesting that they are responsible not only for broadening the child's linguistic abilities, but also facilitating cognitive development. Based on the assumption that adults systematically adapt the linguistic and cognitive difficulty of their questions to the competence level of the child, this paper describes the child's developing abilities to perform well in question-answer interactions and provides a schema for characterizing the adult's adaptation and for evaluating its effects on the linguistic performance of the child.

Acquisition of Questions and Answers

The development of the ability to produce acceptable questions and answers seems to be dependent upon two closely related areas of development within the child: intellectual growth and increasing syntactic or grammatical abilities. Clearly, his ability to produce questions which are syntactically and meaningfully appropriate will be influenced to a great extent by the questions addressed to him by adults.

Development of Questions

Children gradually develop the intellectual capacity to understand the functions of questions. Initially, production of various wh-questions seems to be strictly the result of rote memorization (Brown, 1968). Lewis (1963) has suggested three subsequent stages in question-asking behavior. First, children begin to ask questions in a game situation. It appears they are not actually interested in the answer, but rather in the pleasure of the verbal interchange with someone. Next, children seem to ask questions to test the correctness of what they believe (a rudimentary form of hypothesis testing). Third, children produce questions regularly with the intent of securing information about their environment. These various stages occur as the child moves from a completely egocentric view of the world to one in which he is aware of perspectives other than his own. Further development is required for a child to understand the variety of functions served by questions for adults. For example, it is a common occurrence for a child to be baffled when an adult asks a question (whose answer he surely must know) simply to test the child's knowledge.

With respect to production of questions, Roger Brown (1968) has offered a simplified version of the syntactic rules a child must master. He hypothesizes that the interrogative words who, what, when, why, and how (wh-words), can be considered as replacements for various constituents in the sentence. For example, in the sentence "John will read what?", the wh-word is a substitute for a category of noun phrases which would provide suitable replies. "John will read what?", however, is not the normal adult form of a question, being used only occasionally in standard English. In order to achieve the normal question Brown states that two transformations must occur. The first transformation (labeled preposing rule) involves shifting the wh-word to the beginning of the sentence. A sentence produced in this manner is only a hypothetical intermediate in adult

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speech. It has the resulting form of "What John will read?". The second step involves interchanging or transposing the subject and the auxiliary verb in order to obtain the normal interrogative form, "What will John read?". According to Brown, all wh-questions, except the simple who/what-subject question, can be generated with these two transformational rules. It should be noted that the do auxiliary must be introduced when no other auxiliary exists.

In his analysis of the spontaneous speech of three young children, Brown found that certain stages in the child's development of wh-questions correspond to intermediate hypothetical strings in his transformational analysis. Although no evidence was observed for the omission of the preposing transformation, the children for a time did produce questions without the insertion of do or without the transposing transformation. Similar results have been reported by Ravem (1970) for the wh-questions of two children learning English as a second language.

In addition to wh-questions, adults produce two other question types: yes/no questions and tag questions. It has been shown (Bellugi, 1965; Klima & Bellugi, 1966) that simple yes/no questions are usually the first type to be produced correctly, presumably because they involve the fewest transformations. Since there is no wh-word, the child is only required to introduce the "do" auxiliary, if necessary, and to transpose the verb. On the other hand, appropriate English tag questions are the most difficult for the child to produce because he must attend to several additional linguistic factors. For example, to generate the tag question, "John drives the car, doesn't he?", the child must substitute a pronoun for the subject noun, truncate the main verb, and apply a negative transformation as well as perform the usual operations for a question. In studying French-English bilingual children, Swain (1971) observed the following the developmental pattern in the production of yes/no questions. Appropriate intonation was first mastered (e.g., "You are going?"). Secondly, "special purpose" morphemes or immature tags were produced (e.g., "You are going, huh?" or "You did it, right?"). Finally, the child was able to rearrange the constituents in a sentence to produce a well-developed yes/no question. One might expect that the production of the full-form tag question would occur in an even later stage.

In dealing strictly with the syntactic dimension of question and answer acquisition, Brown (1968) suggests four types of adult-child interactions which give a child instruction in the syntactic formation of a wh-question. The development of the wh-word what will be explored through these four training sessions. The first input sequence occurs when the adult finds the entire utterance of the child unintelligible. An adult says "What?" in such a way as to cue the child to repeat the phrase again. This step in itself does not instruct the child in the acquisition of wh-formations but is responsible for the child's realization that a wh-word places a demand upon him for some type of response. The second training situation, called echoing or "say constituent again", occurs if only part of the child's utterance is unintelligible. The adult responds by repeating the portion understood and replacing the unintelligible constituent with the proper wh-form. For example:

Child: I want m. . . Mother: You want what? Child: Milk.

In his longitudinal study Brown found this complex reoccurring frequently in the conversation of mother and child, and it is not unreasonable to hypothesize that it also occurs frequently within the classroom. Furthermore, Brown found that this occasional form of the question was most effective in eliciting appropriate responses from children. In essence, the occasional question form teaches the child the principle of constituent replacement, or what Ervin-Tripp calls the syntactic features of the question word. The third type of input session,

called constituent prompt, teaches the child the transformation of preposing. In this interchange the adult asks the child a question in the normal form. Receiving no answer the adult re-formulates the interrogative sentence using the occasional question form. For example:

Adult: What do you want? Child: (no answer). Adult: You want what?

The final training session described by Brown teaches the child that the wh-word often implies specification of the reference of an indefinite pronoun or demonstrative word which was used in a previous interchange. It enlarges the child's concept of constituent replacement. For example:

Child: I want it. Adult: You want what? Child: I want milk.

Several other investigators suggest adult-child interaction patterns which may prove valuable for the child acquiring interrogative ability. In particular, Ervin-Tripp (1970) posits a sequence which shows the child the direct relationship between a question form and an expected answer (e.g., "Where is the ball? Here is the ball."). One can hypothesize that this step would occur very early in the child's development since no answer is expected nor any feedback involved. Essentially, this pairing of question and answer teaches the child, as does Brown's first input session, that particular question words and a certain intonation are intended to elicit a verbal response.

An additional type of adult question which would facilitate language acquisition was found in some of our transcriptions of therapist-child sessions. This type of training situation, called constituent insertion, serves as a request for elaboration. It seems to teach the child the demands of appropriately "filling in the blank" (e.g., "We see horses, dogs, and . . .?" or "After you went to the store, you went . . .?").

Development of Answers

The ability to appropriately answer questions develops at the same time as interrogative sentences, but in a slightly different manner. Ervin-Tripp (1970) conducted a study involving twenty-four children ages 2½ to 4 years. Each child was seen periodically during eight months and required to answer standardized questions about a picture book. Her hierarchy of response development involves three stages. First, the child merely responds with an associative answer to stressed words in the sentence. At this stage the child does not intellectually understand the function of questions. The second stage occurs when the child understands the replacement demands of a question, but has not fully mastered the specific features of particular wh-words. For example, a where question may elicit an object response rather than a locative response. Finally, the child is cognitively able to integrate his syntactic and semantic rules to produce a correct reply. Ervin-Tripp's research revealed that children first responded correctly to yes/no questions followed in order by what, where, what-do, whose, who, why, where-from, how, and when. Also, Piaget (1955) and Cromer (1968) suggest that questions with why and when are particularly difficult because of the cognitive complexity of the concepts of causality and time.

As indicated by Brown's findings, syntactically simplified questions may be easier for a child to answer, at least under some circumstances. For example, in the sentence "You are going where?" the operations of preposing and transposing are eliminated. The linguistic input is thus less complicated and closer to the theoretical base structure of the underlying declarative sentence. Furthermore, the placement of the interrogative word at the end of the sentence focuses atten-

tion directly upon it. Research concerning this hypothesis would have important implications for training language-delayed children.

In his discussion of question-answer interactions, Leach (1971) stressed the cognitive requirements of various types of questions, the form of which places particular response constraints upon the child. For example, to answer a who question appropriately a child must generate an animate noun as a constituent replacement whereas an explanation is required by a why question. The notion of response constraint can account for the fact that tag questions, despite their syntactic complexity, are quite easy to answer. Not only is the choice of possible answers restricted to yes or no but also the tag actually suggests the expected answer. Furthermore, Leach suggested, the situation in which the question is asked imposes constraint upon the child. It is easier for a child to answer a question with the referential source present rather than absent. In addition, questions accompanied by an action which is a cue to the reply are easier to answer. For example, pointing to the boy in a picture while inquiring, "What is the boy doing?", should help a young child to respond correctly.

The notion of constraint was also crucial in a study by Williams and Naremore (1969) of the response styles of lower and middle class children. After they noticed that the type of interviewer's questions affected the subjects' responses, they categorized response-type as a function of the type of constraints imposed by the question. According to their analysis, the lower status child had more of a tendency to answer questions minimally, whereas the higher status child tended to go beyond the demands of the situation occasionally and elaborate an idea at length.

Leach studied the role of adult adaptation specifically with respect to the facilitation of question-answer acquisition. He suggested that the crucial factor in the development of this ability is not so much a specific input sequence, but the ability of the adult to adapt the cognitive and syntactic difficulty of his questions to the performance level of the child. Leach hypothesized that the normal process of language acquisition can be described as a progression from a limited set of responses to a broad and varied set. If parents and adults are responsive to the child's limitations and advancements, then a positive relationship will exist between the child's increasing response capabilities and the changing demands placed upon him by adults. This type of positive relationship is important in facilitating the child's development; it must be sensitive enough to activate the child and at the same time to avoid frustrating him.

Support for Leach's hypothesis was found in his data which were gathered from the interactions of seven mothers with their children. The findings indicate a shift in the types of verbal demands placed upon an older child by an adult in direct relation to the child's improved language capability. Adult questions addressed to younger children were of limited type and showed high concentration in a few areas. Although the mothers sometimes demanded explanation or elaboration in speaking with the younger children, the majority of the interrogative sentences required only yes/no answers and nominal or verbal constituent replacements. As the child grew older, the frequency of questions demanding elaboration and explanation increased. To summarize, as the intellectual ability of the child advances, he is able to answer a more varied pattern of questions, and the adult naturally addresses a greater variety of questions to him. Through the adult's adjustment to a child's changing abilities, Leach feels that the child learns appropriate question-answer behaviors.

The Analysis of Question-Answer Interactions

At this point, we would like to present, briefly, our proposed method for

systematically investigating the question-answer interaction between adults and children. The approach combines the syntactic role of verbal interactions which Brown stresses with the more cognitive role of adult-child interaction stressed by Leach. Through the categorization of various behaviors of adults and children in the question-answer interchange it should be possible to clarify the nature and effects of speech accommodation. The proposed system could enable an objective measure of the manner in which adult and child speech change as a function of each other.

In order to typify the adult's speech in the question-answer interchange, it is necessary to acknowledge the adult's simultaneous adjustment to both the syntactic and cognitive performance of the child. Such systematic speech accommodation serves as a training session in which the child is exposed not only to the demands of progressively more difficult intellectual concepts but is also given exposure to the various surface structures which are related to the meaning of the concept as it becomes more refined in the child's mind. A concrete example is the following:

Original open-ended question:	1.	Why is the boy smiling in this picture?
Simplification of response constraint	2.	(a) What is the boy holding? (b) Is the boy holding the ball or the book? (c) He is holding a ball, isn't he?
Simplification of syntax	3.	The boy in this picture is smiling. Why?

Due to the frequent occurrence of such patterns of simplification, it is hypothesized that an adult accommodates his question to a child by adjusting the response constraints and the syntactic structure to the comprehension level of the child. Based upon this hypothesis, each adult question can be rated along ordinal dimensions of response constraints and syntactic complexity.

For the dimension of response constraints, question types are ranked in terms of the cognitive difficulty of the answer. The easiest type of question to answer is one for which the choice is restricted to yes or no, with the very simple subcategory of negative and tag questions specifically suggesting the appropriate answer. Questions which provide alternative answers from which to choose (e.g., "Do you want cake or cookies?") are slightly more difficult because the answer depends to a greater degree on the specific content of the question. The third type of question the child learns to comprehend as he matures would consist of wh-questions which require a constituent replacement (e.g., where demanding a location and when demanding a time adverb). In this type of question the cue is not provided by the entire sentence, but by the nature of the wh-word itself. Finally, the last category would contain open-ended elaborative questions (e.g., why and how) which require a new clause. In essence, therefore, the scale ranges from questions in which the cognitive cueing is quite high to sentences in which the child must rely on his own intellectual processes to generate appropriate replies. Greater refinement of each category, especially the differentiation of questions within the constituent-replacement category, may also be helpful.

For the syntactic dimension of questions, four broad categories are suggested: simple (one or two words), incomplete form (a required question transformation missing), complete form (including question transformations), and

complex form (complete form with additional clause(s) or major transformations such as negative or passive). Thus, for example, a tag question with 'right' would belong to the second category while the full-form tag question would belong to the last category.

In order to test the hypothesis that adult speech adaptation functions as a training situation for children, it is necessary to categorize the child's answers. The answers of a young child can be scored along two dimensions: appropriateness and syntactic complexity. The appropriateness dimension must, at least, include categories for a totally inappropriate answer, a syntactically appropriate but semantically incorrect answer, and an answer which is both syntactically and semantically appropriate. Where no answer occurs, criteria can be established to determine whether the adult question was rhetorical or whether an answer was expected.

The syntactic complexity of the response would be categorized as follows: yes or no, incomplete sentence of two words or less, incomplete sentence of more than two words, complete sentence, and complex sentence (with more than one clause or a major transformation such as negative or passive).

Through the use of this categorization scheme in an observational setting with children of various ages and abilities, it should be possible to acquire information concerning: (1) the theoretical role of the linguistic environment in speech development; (2) the types of adult accommodation which are most effective in producing appropriate replies at the various stages of development; (3) the types of child responses which tend to elicit particular types of adult accommodation.

The implications of such knowledge for language training techniques are of special significance. A graded progression of exercises could be devised with questions of greater complexity occurring with greater frequency in the later sessions and the decision to move into a more advanced exercise dependent on an evaluation of the child's answers. Ratings of a particular child's response performance could be utilized in the design of an individualized questioning style. Especially important are the possibilities for guiding the parents of language-delayed or mentally retarded children. By analyzing a parent-child interaction, a therapist would not only be able to pinpoint the child's problems, but also provide the parent with valuable information related to his role as a language trainer. The parent could be instructed in "how to talk" and "how to listen" to his child in order to encourage optimal language development with minimal frustration.

Summary

The question-answer interchange between adult and child is seen to be crucial for the child's linguistic and cognitive development. It is through questions that a child learns that a conversation is a two-way process and that he must play an active part. Before he can participate appropriately, he must understand the function of questions, their conceptual content, and their syntactic structure. It has been suggested that adults accommodate their speech to the child's linguistic and cognitive level by selecting from a restricted set of easier questions initially and progressively increasing the frequency of more difficult questions as the child shows evidence that he can handle them. The proposed categorization scheme will allow for the empirical investigation of this suggestion and hypotheses concerning the theoretical role of such speech adaptation in syntactic and intellectual development as well as provide data for the design of language training programs.

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